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A revision of the genus *Antepione* Packard with description of the new genus *Pionenta* Ferris (Lepidoptera, Geometridae, Ennominae)

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Abstract

Based on genitalic studies, the new genus *Pionenta* is established for two taxa formerly placed under *Antepione*. The taxa *hewesata* and *ochreata* (and previously associated synonyms) are now synonomized as *Pionenta ochreata*. Three species of *Antepione* are now recognized: *A. thisoaria*, *A. imitata*, *A. tiselaaria* with the taxa *comstocki*, *constans*, and *indiscretata* synonomized under *A. imitata*. No new species are described. Adults and genitalia are illustrated, including type specimens.

Keywords

Antepione, Arizona, Colorado, Costa Rica, Ennominae, Geometridae, Guatemala, Lepidoptera, Mexico, New Mexico, nomenclature, North America, *Pionenta*, taxonomy, Texas

Introduction

A genitalic study of the eight species recognized by Parsons et al. (1999) associated with genus *Antepione* uncovered two distinct and quite different forms in both the male and female genitalia. This situation was alluded to by Pitkin (2002: 283), who excluded *Antepione ochreata* (Hulst) in her treatment of the genus. In *Antepione*, as restricted herein, the

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male genitalia lack a furca, and the female genitalia lack a signum. I recognize three species of *Antepione*. *Antepione thisoaria* (Guenée) is widely distributed in eastern North America with additional records for Mexico, Guatemala and Costa Rica. *A. imitata* occurs in the southwestern United States from Texas to Arizona. *A. tiselaaria* (Dyar) ranges from central Mexico to Costa Rica. In the genus *Pionenta*, as subsequently described, I recognize only one species, *P. ochreata*. The male genitalia have a stubby robust furca, and the female genitalia a single large stellate signum. The species assigned to both genera are sexually dimorphic and extremely polyphenic, which, lacking genitalic examination, historically apparently led to the descriptions of multiple taxa. My field collections of multiple specimens in ultraviolet light traps at single sites and subsequent genitalic dissections allowed me to assess variation. The range of *Pionenta* is southwestern New Mexico and southeastern Arizona. It most likely occurs in contiguous northern Mexico, but I have found no records.

Materials and Methods

Repository abbreviations

AMNH American Museum of Natural History, New York, NY, USA.
ANSP Academy of Natural Sciences, Philadelphia, PA, USA.
BMNH The Natural History Museum (formerly British Museum [Natural History]), London, UK.
CDF Personal collection of Clifford D. Ferris, Laramie, WY, USA.
CMNH Carnegie Museum of Natural History, Pittsburgh, PA, USA.
CNC Canadian National Collection of Insects, Arachnids, and Nematodes, Ottawa, Ontario, Canada.
EME Essig Museum of Entomology, University of California, Berkeley, CA, USA.
FMNH Field Museum of Natural History, Chicago, IL, USA.
MCZ Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA.
MNHN Museum National d'Histoire Naturelle, Paris, France.
SEM Snow Entomological Museum Collection, University of Kansas, Lawrence, KS, USA.
USNM National Museum of Natural History [formerly United States National Museum], Washington, District of Columbia, USA.

Methods and general terminology. Terms for genital structures and wing markings follow Ferris and Schmidt (2010).

Description abbreviations

AML Antemedial line.
DFW Dorsal forewing.

DHW Dorsal hindwing.
FWL Forewing length, measured along costa from base to apex.
MB medial band = area between DFW AML and PML.
PML Postmedial line.
TL Type locality.

Key to genera

(based on DFW pattern and genitalia)

1 DFW triangular costal dark patch present; male genitalia lack furca; female genitalia lack colliculum and signum .....***Antepione***

– DFW triangular costal dark patch absent; male genitalia with robust stubby furca; female genitalia with colliculum and signum..... ***Pionenta ochreata***

Key to *Antepione* species

(based on genitalia)

1 Male genitalia: apical region of valva lacks spines. Female genitalia: corpus bursa oblong and initially swollen with membranous anterior sac.. ***thisoaria***

– Not as above **2**

2 Male genitalia: valva rounded at apex with 3 long robust spines and additional fine setae. Female genitalia: corpus bursae long and cylindrical with membranous anterior sac .....***imitata***

– Not as above **3**

3 Male genitalia: valva rounded at apex with multiple short slender translucent spines over most of surface excepting toward base. Female genitalia unknown to author.....***tiselaaria***

Antepione Packard, 1876: 459, 483

Type species: *Epione depontanata* Grote, 1864. Location of type unknown; originally placed in ANSP. Described from Maryland, USA.

Mimogonodes Warren, 1895

Type species: *Mimogonodes constricta* Warren, 1895 [BMNH].

Diagnosis. Adults. Medium sized (FWL 13–21 mm) basically ochreous-colored moths with variable markings on DFW. DFW outer margin angulate at vein M_3. Separation from similar genera is by the combination of characters: filiform anten-

nae; male genitalia with stout tapered decurved uncus, valvae with even outer margins lacking projections, absence of furca; female genitalia without colliculum and signum.

Description. Adults. Sexually dimorphic and sexes polyphenic; FWL 13–21 mm. Antenna simple, more slender in females. *Head* – Dark ochreous speckled with darker scales, concolorous collar; labial palpi broad, barely extending beyond frons, ochreous speckled with darker scales. *Thorax, abdomen, legs* – Ochreous or pale tan as in wings with widely scattered small brown scales. *Wings* – FW outer margin arcuate at vein M_3 and HW; DFW apex acute to falcate. Usually obscure narrow dark DFW submarginal band; small dark discal spots both wings. **Males.** Dorsal color varies from gray, medium ochreous to medium brown. DFW AML and PML variable from pronounced and dark to broken and indistinct; medial band concolorous with remainder of wing, or paler and yellowish; a dark triangular patch with blunted or acute apex, with or without pale oblong spot, located along costa distad of PML. DHW with dark narrow medial band varying individually from dark to indistinct. Ventrally paler with dorsal maculation repeated, usually with less intensity. **Females.** Dorsal color varies from yellow through pale ochreous to medium ochreous and gray. Crosslines usually indistinct. DFW triangular patch as in males, PML above inner margin expanded into two large oblong brown spots. Ventrally paler with dorsal maculation repeated, usually with less intensity. *Male genitalia* – Uncus stout, slightly decurved, tapering to a rounded tip; medial gnathos with a few small teeth; valva rounded at apex; anellus with small spines; aedeagus truncate with one large oblong cornutus near base of vesica. *Female genitalia* – Apophyses long, slender; posterior apophyses ca. 1.8 × anterior apophyses; colliculum absent; ductus bursae ridged, short, partially sclerotized at posterior end; corpus bursae without signum, oblong with membranous anterior sac; ductus seminalis originates at top of ductus bursae.

Remarks. McDunnough (1938) treated *Epione depontanata* and *Heterolocha sulphurata* Packard, 1876 as synonyms of *Hyperythra arcasaria* Walker, 1860. Forbes (1948:108) placed *Hyperythra arcasaria* as a synonym of *Heterolocha thisoaria* [Guenée, 1858], which he then placed as *Sabulodes thisoaria*, and lumped several genera, including *Antepione*, under *Sabulodes* Guenée [1858]. Subsequent authors (Ferguson, 1983; Covell, 1984; McGuffin, 1987) restored *Antepione* as a separate genus. Ferguson recognized the species: *comstocki* Sperry; *hewesata* Sperry; *imitata*, H. Edwards.; *indiscretata*, (H. Edwards); *ochreata* (Hulst); *thisoaria* (Guenée); *tiselaaria* (Dyar). The geographic range of the genus includes eastern North America, the southwestern United States, portions of Mexico, Costa Rica and Guatemala.

Systematics

***Antepione thisoaria* (Guenée, 1857 [1858])**
Figs 1, 11–19, 59

Antepione sulphurata Packard 1876: 484
Epione depontanata Grote 1864: 90

Eutrapela furciferata Packard 1876: 559
Gonopteryx rhomboidaria Oberthür 1912: 246, pl. 148, f. 1401
Heterolocha sulphurata Packard 1873: 79
Heterolocha thisoaria Guenée 1857 [1858]: 106.
Hyperythra arcasaria Walker 1860: 131
Mimogonodes constricta Warren 1895: 149
Sabulodes thisoaria Forbes 1948: 108
Tetracis azonax Druce 1892: 54, pl. 46, f. 8
Tetracis rivulata Warren 1897: 506

Type material. Female HT (Fig. 1), country of origin not stated [MNHN].

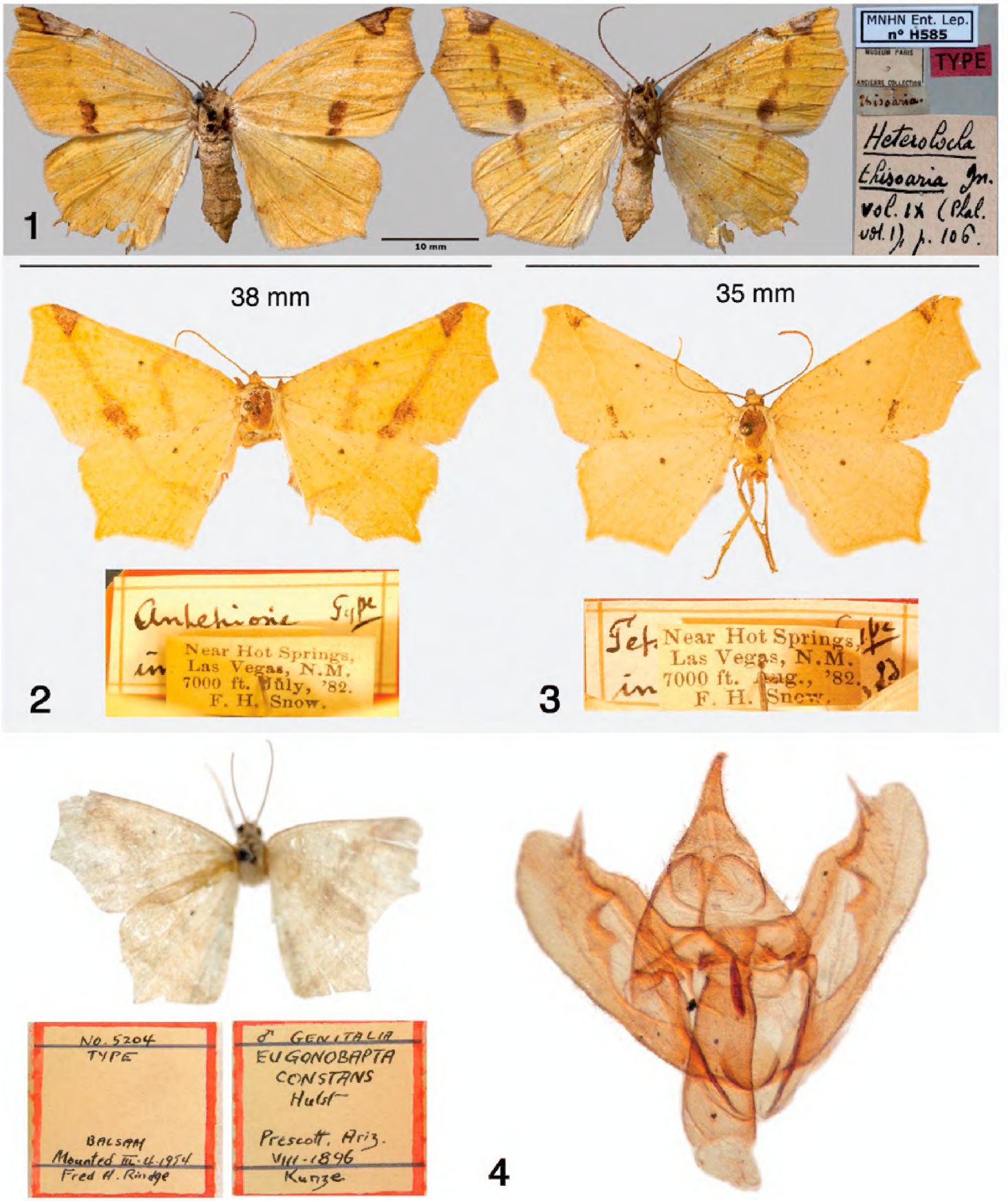
Fixation of type locality. The Central American taxa were not recognized and described until 1892 (*azonax*) and 1912 (*rhomboidaria*). On this basis, I infer that specimens from this region were not available to Guenée in 1857 when he described *thisoaria*, and that the holotype was collected in eastern North America. In habitus, the HT matches exactly female specimens of the *sulphuraria/sulphurata* form. The HT was most probably collected in the Middle Atlantic region. I hereby fix the type locality as eastern North America. Based on my research, it appears that Forbes (1948) was the first to use the name *thisoaria* in the North American fauna.

Other material examined. 84 specimens (a few by photograph) from Alabama, Indiana, Kentucky, Mexico, Michigan, New Jersey, New York, Nova Scotia, Pennsylvania, Quebec, Tennessee, Virginia. Additional distribution records were obtained from individuals and several museums, including 439 from the Carnegie Museum of Natural History, Pittsburgh, PA.

Diagnosis. ***Antepione thisoaria*** is most easily separated from *A. imitata* based on geography. It does not occur west of the 95th parallel, while *A. imitata* extends eastward only to west Texas, and is not recorded from Central America. In the male genitalia, the apical region of the valva lacks spines, which are present in the valva of *imitata*. In the female genitalia, the corpus bursae is initially swollen while not so in *A. imitata*.

Description. Adults. As described above for the genus. **Genitalia.** Figs 17–19. Two dissections (male and female) by author; illustrations in McGuffin (1987, Figs 242g, 245e); Pitkin (2002, Figs 202, 460). *Male genitalia* – Uncus stout, slightly decurved, tapering to a rounded tip; gnathos with unjoined slender arms, medial gnathos with a few small teeth; valva rounded at apex without spines, produced ventral ridge forming two short projections; anellus with two sclerotized spinose lobes; aedeagus truncate with one large narrow elliptical cornutus near base of vesica. *Female genitalia* – Apophyses long, slender; posterior apophyses ca. 1.8 × anterior apophyses; ductus bursae ridged, moderately short, partially sclerotized at posterior; corpus bursae without signum, corpus bursae without signum, oblong and initially swollen with membranous anterior sac; ductus seminalis originates at top of ductus bursae.

Biology and distribution (Fig. 59)**.** McGuffin (1987: 88–89) described the early stages and cited three specific larval hosts: *Alnus rugosa* (Du Roi) Spreng; *Physocarpus opulifolius* (L.) Maxim; *Prunus serotina* Ehrh. Various additional larval hosts are report-



Figures 1–4. *Antepione* species. **1** *A. thisoaria* HT (dorsal and ventral) with pin labels (MNHN photo) **2** *A. imitata* HT with pin labels (SEMC photo) **3** *A.* (*Tetracis*) *indiscretata* HT with pin labels (SEMC photo) **4** *A.* (*Eugonobapta*) *constans* HT, adult, pin labels (AMNH photo) and male genitalia. The balsam embedding medium has fogged with age producing the apparent lack of focus in the genitalia photo.

ed in the literature in the families Aceraceae, Anacardiaceae, Betulaceae, Ebenaceae, and Rosaceae. The last instar larva was illustrated by Wagner et al. (2001, p. 155) and Wagner (2005, p. 195). Adults fly April–May with an occasional mid-March and mid-June record, July–August with occasional September to mid-October records. There is

one generation in Canada, and at least two southward. The distribution map (Fig. 59) represents the data that I was able to locate. The heavy distribution in Pennsylvania reflects intensive collecting in that state by CMNH personnel and volunteers. Undoubtedly similar efforts in neighboring areas should produce additional records. The overall range of this species is: in **CANADA** from Nova Scotia to Manitoba; in the **UNITED STATES** (county records in parentheses) then south and west to the Gulf states to the 95th parallel, including **Alabama** (Bibb, DeKalb, Jackson, Madison, Monroe), **Arkansas** (Logan, Montgomery, Polk, Scott, Washington), **Connecticut** (Fairfield, Hartford, New Haven, New London, Tolland, Windham), **Georgia** (Cherokee, Rabun), **Illinois** (Cook, Macon), **Indiana** (Elkhart, Jackson, Jasper, Lagrange, Laporte, Monroe, Newton, Perry, Pulaski, St. Joseph), **Iowa** (Johnson, Monroe), **Kansas** (Crawford), **Kentucky** (Bell, Boone, Bracken, Bulitt, Calloway, Carter, Fayette, Graves, Harlan, Jefferson, Madison, McCracken, Meade, Menifee, Metcalfe, Morgan, Muhlenberg, Oldham, Owsley, Powell, Rowan, Russell, see Covell, 1999), **Louisiana** (Feliciana Parish), **Maine** (Aroostook, Franklin, Oxford, Penobscot, Piscataquis), **Maryland** (Allegheny, Anne Arundel, Baltimore, Cecil, Garrett, Harford, Howard, Washington, Worcester), **Massachusetts** (Berkshire, Dukes, Essex, Middlesex, Nantucket), **Michigan** (Berrien, Cass, Otsego), **Minnesota** (Houston), **Mississippi** (Franklin, George, Grenada, Harrison, Kemper, Lee, Marshall, Oktibbeha, Pike, Pontotoc, Tishomingo, Union, Warren, Webster, Winston), **Missouri** (Barry, Benton, Camden, Cape Girardeau, Carter, Greene, Jasper, Lafayette, Lewis, Madison, Morgan, Newton, Stoddard, Warren, Wayne), **Nebraska** (Cass), **New Jersey** (Burlington, Essex, Gloucester, Morris, Passaic, Sussex, Union, Warren), **New Hampshire** (Rockingham), **New York** (Albany, Kings, Queens, Nassau, Suffolk, Westchester), **North Carolina** (Allegheny, Ashe, Avery, Stokes, Swain, Transylvania), **Ohio** (Adams, Ashland, Ross, Wayne), **Oklahoma** (Cherokee, see Nelson, 2010), **Pennsylvania** (Adams, Allegheny, Armstrong, Beaver, Bedford, Berks, Blair, Bucks, Butler, Centre, Chester, Clearfield, Crawford, Dauphin, Fulton, Greene, Huntingdon, Lawrence, Northumberland, Perry, Somerset, Washington, Westmoreland, York), **Rhode Island** (Washington), **South Carolin**a (Greenville), **Tennessee** (Louden, Wilson), **Virginia** (Augusta, Carroll, Giles), **West Virginia** (Cabell, Grant, Greenbrier, Hampshire, Mason, Monongalia, Monroe, Pendleton, Randolph, Roane, Wyoming); **MEXICO** (Michoacan state); **CENTRAL AMERICA** in Costa Rica and Guatemala (Pitkin et al. 1996). Covell (1984) stated the westward range of the species to Texas. I have been unable to confirm Texas from museum records. Forbes (1948) stated: ". . . varieties in Colorado, Texas, and Arizona." His "varieties" are assumed to be *A. imitata*. Although the distribution map (Fig. 59) suggests occurrence of *thisoaria* in Florida, Vermont and Wisconsin, no records were found.

Remarks. The gray spring form of the moth (Figs 11, 15) was described by Packard as the species *furciferata*. The male (Fig. 14) represents the summer form *arcasaria*, and the female (Fig. 16) represents the summer form *sulphuraria* = *sulphurata*. Packard (1876) redescribed *Heterolocha sulphuraria* Packard, 1873 as *Antepione sulphurata*. Once barcoding data are available, the disjunct distributions of Mexican and Central American populations may ultimately prove to be separate species, in which case the

name *azonax* Druce, 1892 (Costa Rica, Guatemala) is available and has date priority over *rhomboidaria* Oberthür, 1912 (Costa Rica) and *rivulata* Warren, 1897 (Costa Rica). The two female specimens in the CNC from Tuxpan, Michoacan, Mexico are exact matches for the *sulphurarial sulphurata* phenotype and were collected in early August, 1959.

Antepione imitata **Edwards, 1884**

Figs 2–5, 20–33, 59

Antepione comstocki Sperry 1939, syn. n.
Antepione costinotata Taylor 1905
Eugonobapta constans Hulst 1898, syn. n.
Metanema vanusaria Strecker 1899: 6, syn. rev.
Tetracis indiscretata Edwards 1884: 48, syn. n.

Type material. Female HT (Fig. 2), New Mexico, [San Miguel Co.], Las Vegas, July, 1882. [SEMC].

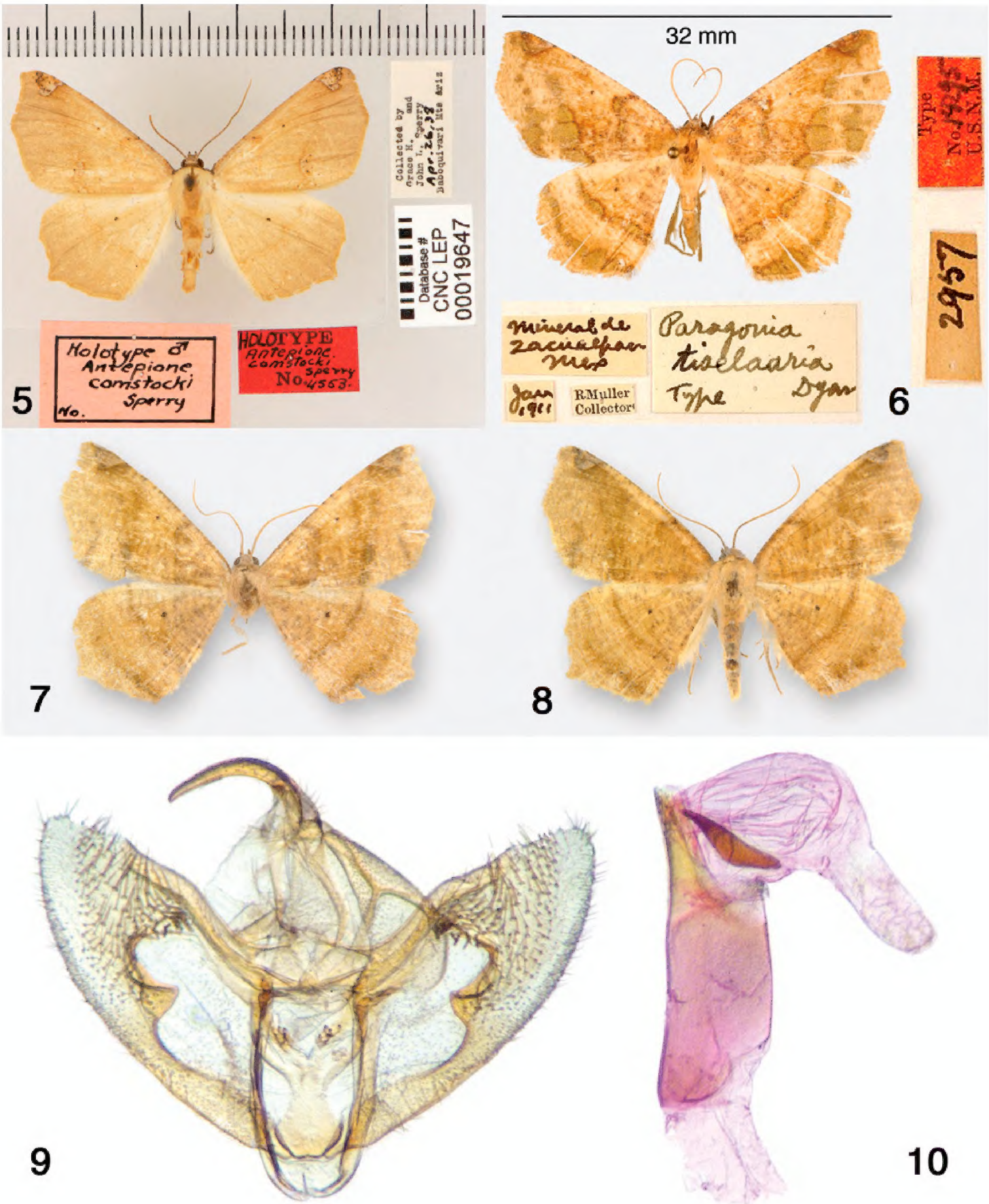
Antepione comstocki male HT (Fig. 5), Arizona, [Pima Co.], Baboquivari Mts., 26 April, 1938 [CNC]. *Tetracis indiscretata* female HT (Fig. 3), New Mexico, [San Miguel Co.], Las Vegas, August, 1882 [SEMC]. *Eugonobapta constans* male HT (Fig. 4), Arizona, [Yavapai Co.], Prescott, August, 1896 [AMNH].

Other material examined. 145 specimens in [CDF] from Arizona, Colorado and New Mexico; additional material (some by photographs) from Arizona (including a reared series), Colorado, New Mexico, Texas, Mexico.

Diagnosis. ***Antepione imitata*** is most easily separated from *A. thisoaria* based on geography. It does not occur east of west Texas and is not recorded from Central America, while *A. thisoaria* extends west only to the 95th parallel. In the male genitalia, the apical region of the valva exhibits 3 long robust spines and additional fine setae, which are not present in the valva of *thisoaria*. In the female genitalia, the corpus bursae is not initially swollen as in *A. thisoaria*.

Description. Adults. As described above for the genus. **Genitalia.** Figs 4, 31–33. Dissections 8m, 2f comprising full range of phenotypes). *Male genitalia* – Uncus stout, slightly decurved, tapering to a rounded tip; gnathos with unjoined slender arms, medial gnathos with a few small teeth; valva rounded at apex with 3 long robust spines and additional fine setae, produced ventral ridge forming two short projections; anellus with two sclerotized spinose lobes; aedeagus truncate with one large oblong cornutus near base of vesica. *Female genitalia* – Apophyses long, slender; posterior apophyses ca. 1.8 × anterior apophyses; ductus bursae ridged, short, partially sclerotized at posterior; corpus bursae without signum, long and cylindrical with membranous anterior sac; ductus seminalis originates at top of ductus bursae.

Remarks. One male specimen (Fig. 25) of the *comstocki* phenotype examined from Las Animas Co., Colorado lacks the characteristic DFW costal triangular patch, caus-



Figures 5–10. *Antepione* species. **5** *A. comstocki* HT with pin labels (CNC photo) **6–10** *A. tiselaaria.* **6** HT with pin labels (USNM photo) **7–8** adult males **9** male genitalic capsule, aedeagus removed **10** aedeagus with vesica everted.

ing it to resemble superficially the *ligata* form of *Pionenta ochreata*. The male genitalia, however, are typical of *A. imitata*.

Biology and distribution (Fig. 59)**.** Noel McFarland (Hereford, AZ) reared the species on *Ribes aureum* Push. from ova from an adult female of the nearly uniformly brownish-ochreous April–May generation; adults emerged June–July. The

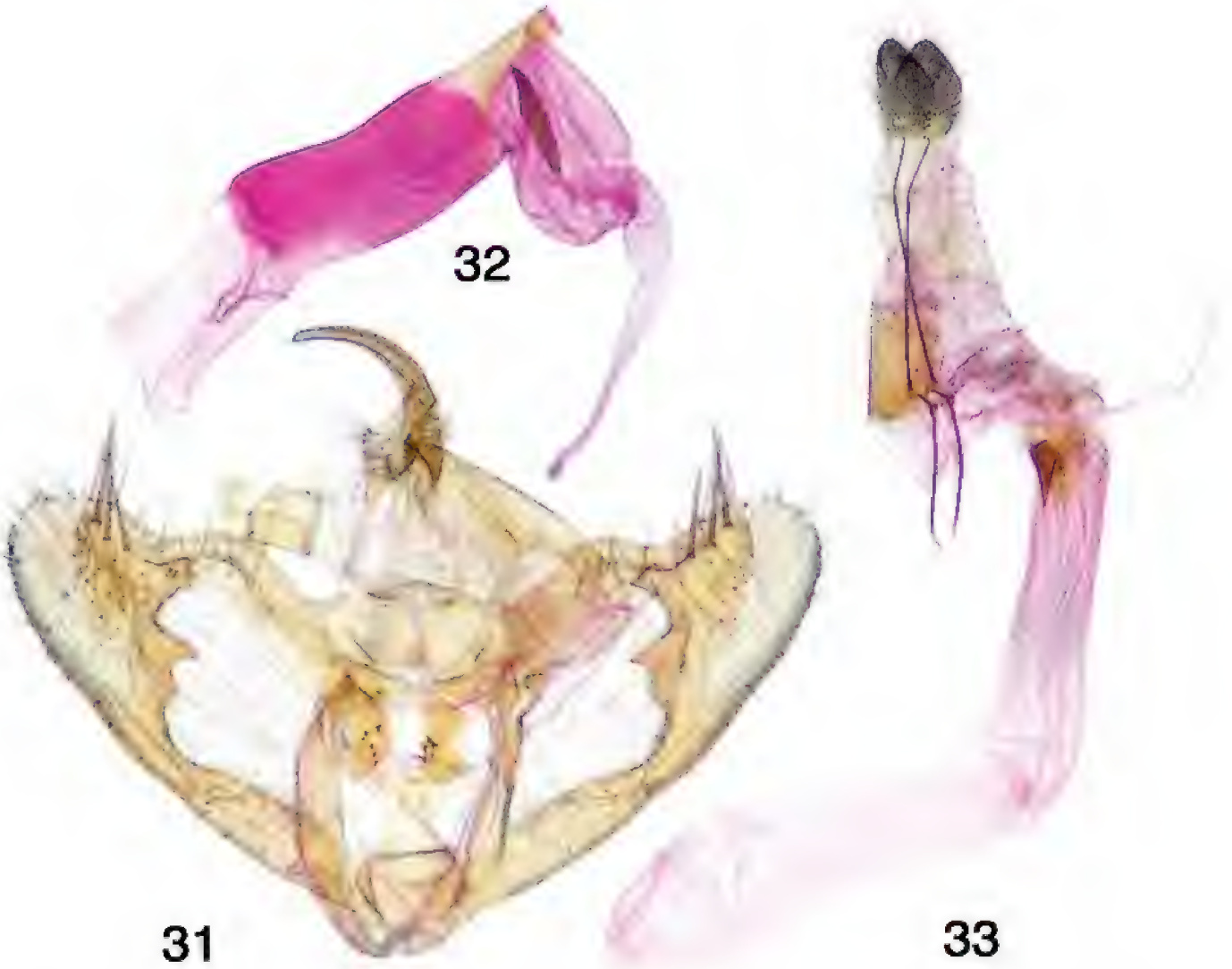
Figures 11–19. *Antepione thisoaria.* **11–14** adult males **15–16** adult females **17** male genitalic capsule, aedeagus removed **18** aedeagus with vesica everted **19** female genitalia.

resulting adults are of the form with yellow females and males in which the DFW medial band has a yellow flush. Based on my field studies over many years in southeastern Arizona and southwestern New Mexico and McFarland's reared material, there appear to be three generations in southeastern Arizona and Southwestern New Mexico. There is a strong early flight starting in April and early May, with a weaker flight in late June into July, and another strong flight beginning in mid-August after the monsoonal rains with a few individuals into early October. This species ranges from west **Texas** (Brewster, Culberson, Jeff Davis), **Colorado** (Delta, La Plata, Las

Figures 20–30. *Antepione imitata* adults. **20–25** males **26–30** females.

Animas), **New Mexico** (Grant, Harding, Hidalgo, San Miguel), to southern **Arizona** (Cochise, Gila, Pima, Santa Cruz). A typical male specimen was examined [CMNH] with the collection data: **Mexico:** Coahuila, Sierra La Madera, upper Canada Desiderio, 15–17 March 1985, 27–08N, 102–31W, 1810m, J. Rawlins, S. Thompson. This locality is essentially due south of the western Texas records, and one might anticipate that with further collecting *A. imitata* will prove to be widespread in northern Mexico. It is generally associated with riparian canyons up to 6000' (1830m).

Discussion. As is also the case with *Antepione thisoaria*, most spring individuals of *A. imitata* are rather drab in appearance with lightly maculated brownish males (the *comstocki* phenotype) and pale creamy colored or ochreous females. The strongly maculated males and yellow females appear in the later generations in company with



Figures 31–33. *Antepione imitata* genitalia. **31** male genitalic capsule, aedeagus removed **32** aedeagus with vesica everted **33** female genitalia.

the rather drab early-season phenotypes. In his original descriptions of *imitata* and *indiscretata*, Edwards provided no insight as to why he assigned *imitata* to *Antepione* and *indiscretata* to *Tetracis*. Both taxa are described on the same page with the description of *imitata* preceding that of *indiscretata*. He characterized the color of *imitata* as similar to the yellow *sulphurata* phenotype of *thisoaria*, and *indiscretata* as "Ochraceus drab." Over the years the type specimens have faded to some extent so that they now appear nearly identical in color, the only difference being the extent of the dark maculation. The name *constans* appears to have been applied to the heavily maculated male phenotype, as best can be determined from the poor condition of the HT.

Antepione tiselaaria (Dyar, 1912)

Figs 6–10

Paragonia tiselaaria Dyar 1912

Type material. Male HT (Fig. 6), Mexico, Minerale de Zacualpan, January, 1911 [USNM]. Comment: Dyar (1912: 87) stated the type locality only as "Zacualpan" and

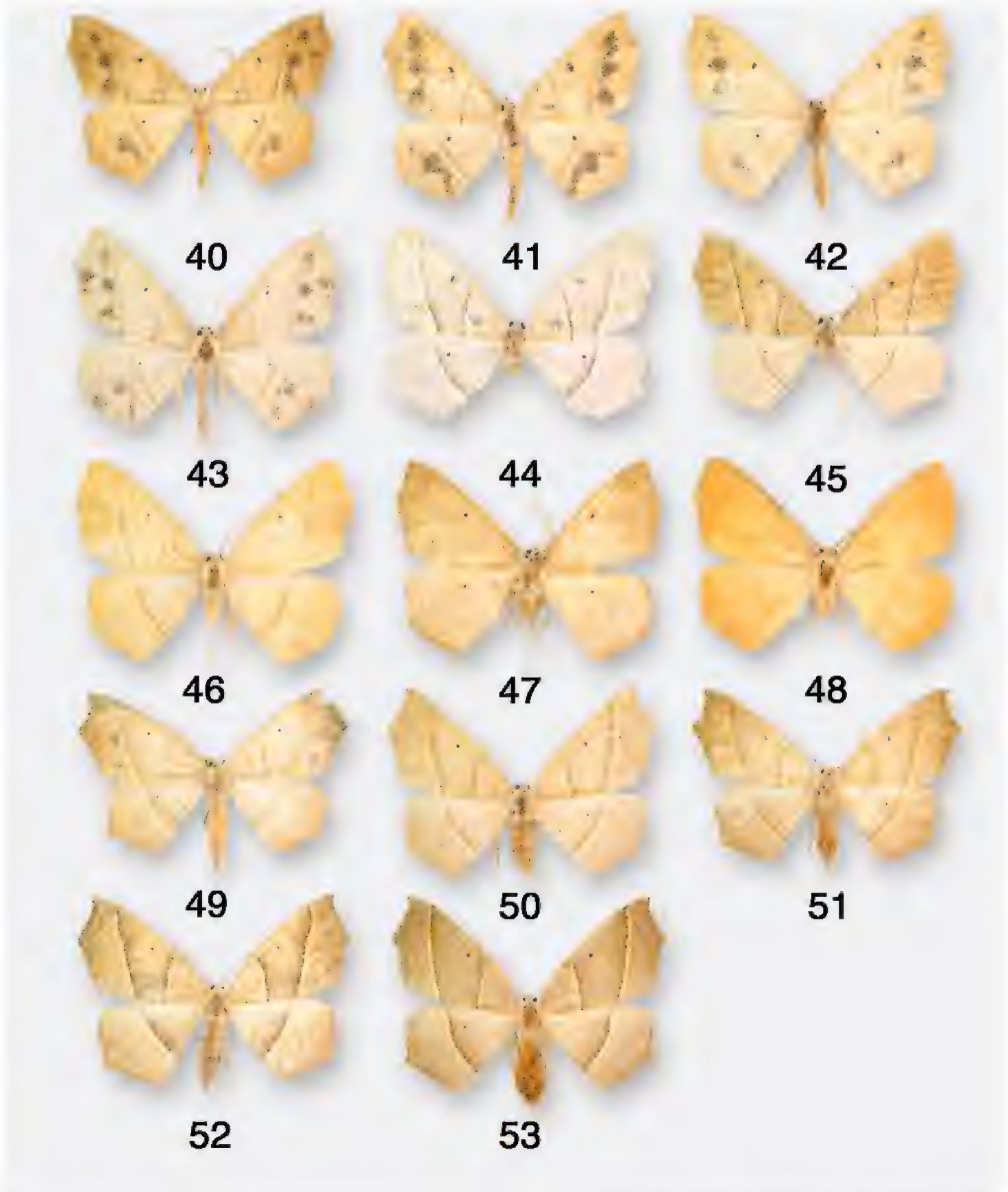
Collection GDHulst
34
Collection of Grace H. and John L. Sperry June 15, 1942 Todd's Lodge Oak Cr. Can. Ariz.
35
Holotype ♀ Antepione hewesata Sperry
Huachuca Mts Ariz
Type No. 117 U.S.N.M.
Photograph Pl. 2 No 12
♂ Genitalia Slide 30 Jan. 1940 H.W.C. #568
Genitalia Slide By Capps USNM 129127
36
37
38
39

Figures 34–39. *Pionenta ochreata*. **34** *P. ochreata* HT with pin labels (AMNH photo) **35** *P.* (*Antepione*) *hewesata* HT with pin labels (AMNH photo) **36–37** *P.* (*Sabulodes*) *ligata* **36** HT with pin labels **37** genitalia **38** *P.* (*Sabulodes*) *arizonata* HT with pin labels **39** *P.* (*Sabulodes*) *dyari* HT with pin labels. (36–39 USNM photos).

not "Minerale de Zacualpan" as shown on the specimen label. I interpret the label to mean the Zacualpan mining region located in the state of Morelos south of Mexico City, today still an active silver mining district.

Other material examined (Figs 7–10). MEXICO. Puebla, 2 mi. SW Tehuacan, 5300', 4.x.1975, Powell (1m, dissected); same, 5.x.1975, J. Powell (1m) [EME].

Diagnosis. Females not known to the author. Mexican specimens of *Antepione tiselaaria* males are most easily separated from *A. imitata* based on geography, since the latter species does not penetrate south to central Mexico. In Costa Rica, where *A. thisoaria* is also



Figures 40–53. *Pionenta ochreata* adults. **40–48** males **49–53** females.

reported, *A. tiselaaria* manifests a more orange-brown overall color than the drab ochreous-gray form of *thisoaria*. In the male genitalia, the apical region of the valva is covered with multiple short slender translucent spines over most of the surface except toward the base; spines are absent in the valva of *A. thisoaria*, and 3 long robust spines occur in *A. imitata*.

Description. Adults. Only males were available for examination. As described above for the genus, other than the wings. FWL 17–18 mm. *Wings* – FW outer margin arcuate (roundly produced about) vein M_3 and HW; DFW apex sightly acute, not fal-

cate. Dorsal color pale orange-brown-ochreous with darker maculation. AML a narrow band centrally with a few paler scales, PML an interrupted band with irregular edges and centrally paler, widening substantially approaching inner margin; MB not clearly defined with splotchy brown maculation over paler ground color; a dark triangular patch with blunted or acute apex, with or without pale oblong spot, located along costa distad of PML; small dark discal spots FW and HW. Ventrally paler with dorsal maculation repeated with slightly less intensity. **Male genitalia.** Figs 9–10. Dissection 1m. Uncus stout, slightly decurved, tapering to a rounded tip; gnathos with unjoined slender arms, medial gnathos with a few very small dark teeth; valva rounded at apex with multiple short slender translucent spines over most of the surface excepting toward the base, produced ventral ridge forming one large and one short projection; anellus with two sclerotized spinose lobes; aedeagus truncate with one large (equal to diameter of aedeagus shaft) oblong triangular cornutus near base of vesica; fully everted vesica initially spherical becoming a tapered tube.

Biology and distribution. Early stages unknown. Current distribution records are for the Mexican states of Morelos and Puebla, and Costa Rica.

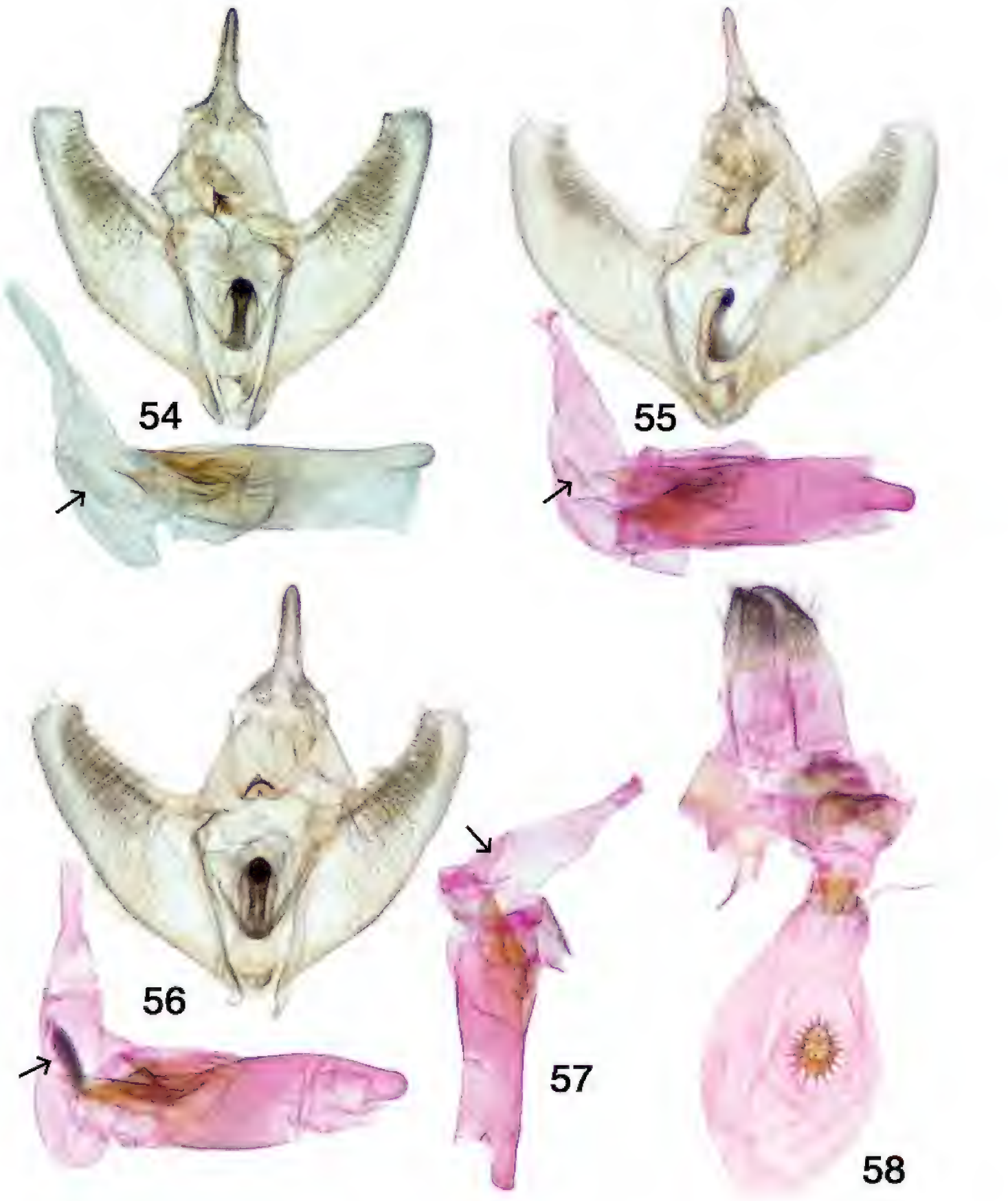
Pionenta **Ferris, gen. n.**
urn:lsid:zoobank.org:act:95BF80CA-F55F-40D9-B877-A25252635770

Type species: *Antepione ochreata* Hulst, 1898.

Etymology. *Pionenta* is a masculine anagram of *Antepione*.

Diagnosis. ***Pionenta ochreata*** lacks the DFW triangular costal patch found in all species of *Antepione*. The well-developed DFW AML and PML form a wedge-shaped medial band absent in *Antepione*. The robust centered furca in the male genitalia and large stellate signum in the female genitalia of *Pionenta* are absent in *Antepione.*

Description. Adults. Sexually dimorphic and both sexes are polyphenic; FWL 14–19 mm. Antenna simple. *Head* – Uniformly ochreous, collar concolorous; labial palpi relatively narrow, slightly upcurved, ochreous, barely extending beyond frons. *Thorax, abdomen, legs* – Uniformly colored as in ground color of wings with a few widely scattered small brown scales on legs. *Wings* – Outer margin arcuate FW (about M3) and HW; DFW apex normally sightly falcate. Wing color variable from pale creamy white to ochreous tan. AML and PML narrow and brown (occasionally reddish-brown), PML continues on DHW as medial line; AML with narrow pale shading basad, PML with narrow pale shading distad. MB trapezoidal tapering inward from costa to inner margin. Small dark discal spots present FW and HW. Scattered dark patches may be present basally and submarginally on DFW, and submarginally on DWH. Ventrally paler with dorsal maculation only weakly repeated. *Male genitalia* (7 dissections by author, additional museum slides examined) – Uncus stout, slightly decurved, tapering at apex to a rounded tip; gnathos v-shaped with well-sclerotized edges, medially a sharp upcurved tip with numerous very small teeth; valva rounded at apex, but with blunt triangular projection at end of sclerotized costa;



Figures 54–58. *Pionenta ochreata* genitalia. **54–57** male genitalic capsules, adeagii removed and adeagii with vesicas everted (arrows point to deciduous setae) **58** female genitalia.

anellus membranous without spines or setae, with central robust cylindrical furca covered by numerous short spines on rounded apex; aedeagus truncate with two long sclerotized pointed extensions from apical margin and a variable patch of apparently deciduous dark setae near base of otherwise membranous short cylindrical vesica. *Female genitalia* (6 dissections) – Posterior apophyses short, anterior apophyses much

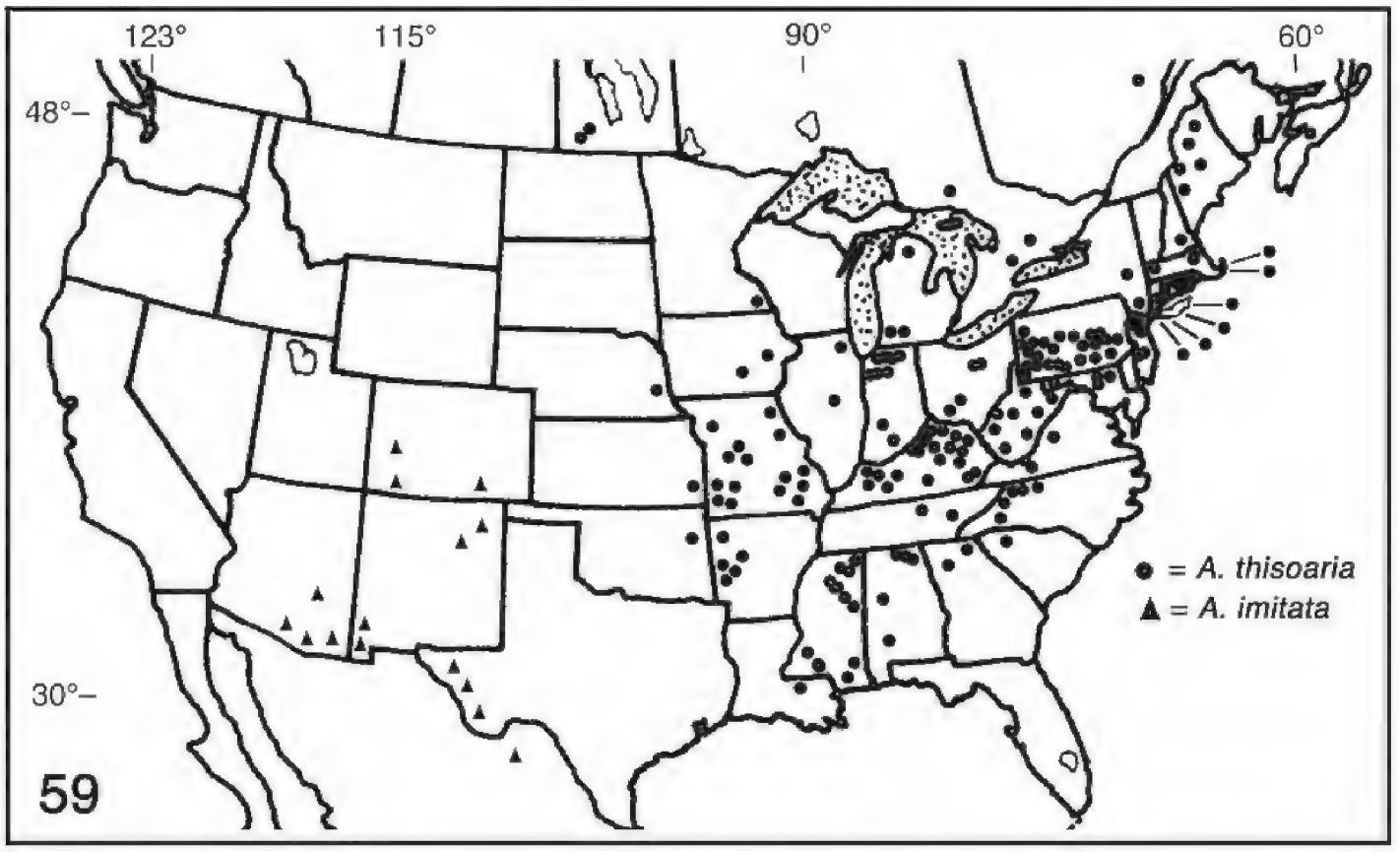


Figure 59. Partial distribution map for *Antepione thisoaria* and *A. imitata*.

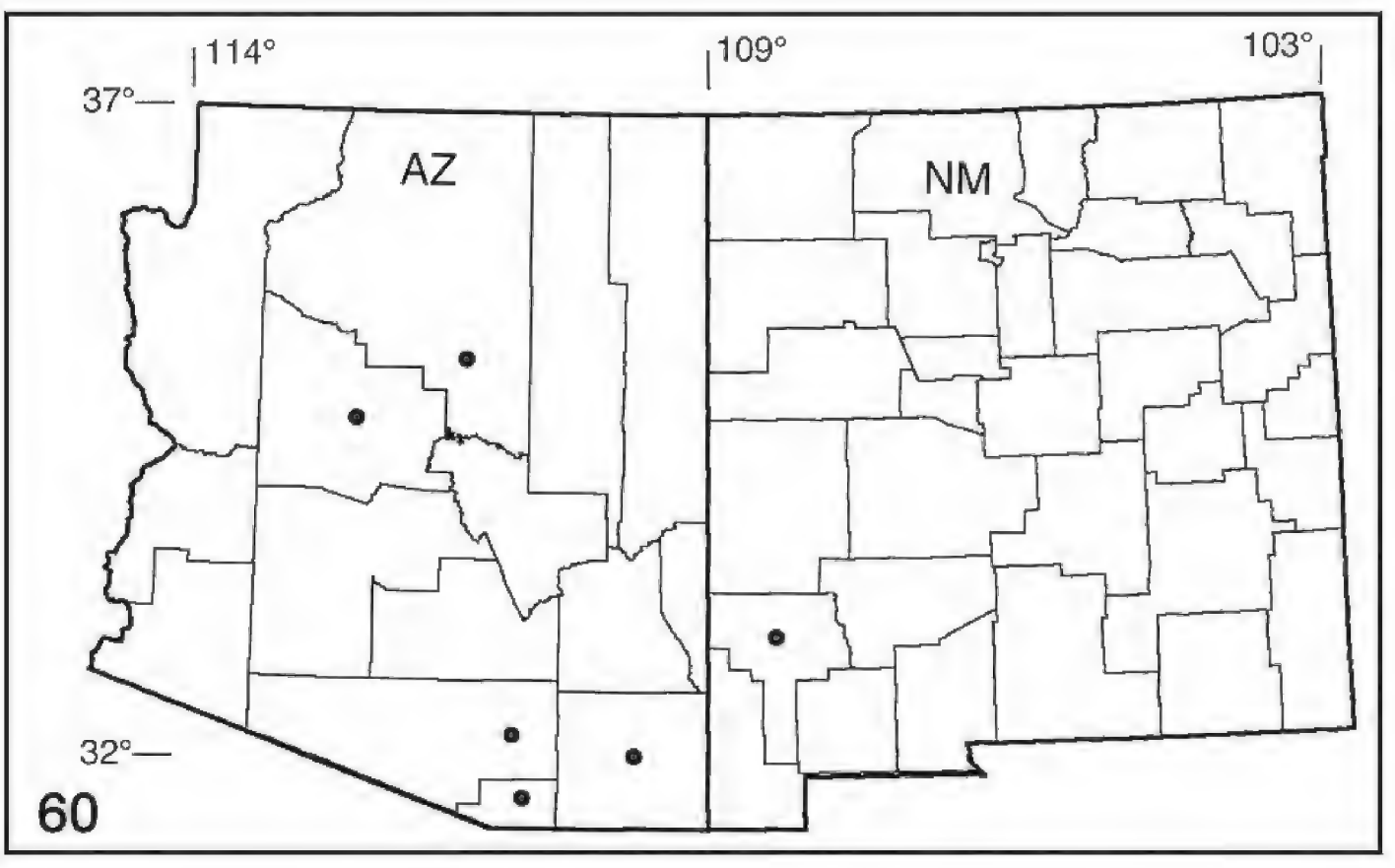


Figure 60. Distribution map for *Pionenta ochreata* (counties only).

reduced ca. 0.4 × posterior apophyses; sterigma well sclerotized; posterior margin of lamella antevaginalis rounded at ends with central depression; well-defined colliculum; partially ridged short ductus bursae opens into ovoid membranous corpus bursae; one large centrally located oval stellate signum; ductus seminalis originates immediately below colliculum.

***Pionenta ochreata* Hulst, 1898**
Figs 34–58, 60

Antepione hewesata Sperry 1948, syn. n.
Sabulodes arizonata Taylor 1905, syn. rev.
Sabulodes dyari Grossbeck 1908, syn. rev.
Sabulodes ligata Grossbeck 1908, syn. rev.

Type material. Male HT (Fig. 34), Arizona, Senator [probably Senator Mine, Yavapai Co.] [AMNH].

Antepione hewesata female HT (Fig. 35), Arizona [Coconino Co.], Oak Creek Canyon, Todd's Lodge, [AMNH]. *Sabulodes arizonata* male HT (Fig. 38), Arizona [Cochise Co.], Huachuca Mts. [USNM]. *Sabulodes dyari* male HT (Fig. 39), Arizona [Cochise Co.], Huachuca Mts. [USNM]. *Sabulodes ligata* male HT (Figs 36–37), Arizona [Cochise Co.], Huachuca Mts. [USNM].

Other material examined. 135 specimens in [CDF] from Arizona and New Mexico; 61 additional specimens (some by photographs) from Arizona.

Diagnosis. As for genus.

Description. General description as for genus.

Remarks. *Antepione ochreata* has two distinct phenotypes. The male form with pale ochreous wing color and varying numbers of multiple dark patches (Figs 34, 40–43) was described as *ochreata*. The female described as *hewesata* (Figs 35, 44) is intermediate between typical *ochreata* and the brownish-tan phenotype without dark patches described as *ligata* (Figs 36, 46, 50–53) which is the usual female form based on my field experience and examination of museum material. Regarding the taxa *arizonata* and *dyari*, apparently some years ago an accident occurred with a drawer containing type specimens and they were badly damaged. Figs 38 and 39 illustrate what remains of these two specimens. Their associated genitalia slides were not damaged and the preparations agree with Figs 37, 54–57.

Biology and distribution (Fig. 60). Early stages unknown. Adults from mid-May to August in riparian canyons and dry coniferous forest to 8400' (2560m); probably more than one generation. Collection records include **Arizona** (Cochise, Coconino, Pima, Santa. Cruz, Yavapai), **New Mexico** (Grant).

Discussion. Based on the male and female genitalia, *Pionenta* is closely related to *Tetracis*. The male genitalia of both genera possess a well defined central furca. The female genitalia of both genera possess a well defined colliculum and prominent single signum. The gnathos in *Pionenta* does not have a quadrate dorso-caudal margin with two to four (occasionally five) widely separated, dorsally projecting teeth as found in *Tetracis* (Ferris & Schmidt, 2010). Once barcoding of the North America geometrid genera has been completed, the relationship of *Pionenta* can be established.

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Appendix: Annotated checklist of the taxa assigned to *Antepione* and *Pionenta*

Antepione Packard, 1876

imitata H. Edwards, 1884, New Mexico, Las Vegas [HT female, SEMC]
- *comstocki* Sperry, 1939, **syn. n.**, Arizona, Baboquivari Mts. [HT male, CNC]
- *constans* (Hulst, 1898), **syn. n.**, Arizona, Prescott [HT male, AMNH]
- *costinotata* Taylor, 1906, Colorado, Durango [HT female, USNM] Note 1
- *indiscretata* (H. Edwards), 1884, **syn. n.**, New Mexico, Las Vegas [HT female, SEMC]
- *vanusaria* (Strecker, 1899), **syn. rev.**, New Mexico [HT male, FMNH]

thisoaria Guenée, 1857 [1858], fixed herein as eastern North America [HT female, MNHN]

arcasaria (Walker, 1860), [HT female, BMNH]
azonax (Druce, 1892) Guatemala, San Geronimo; Costa Rica, Volcan de Irazu [ST female, BMNH] Note 2
constricta (Warren, 1895), ? South America [HT male, BMNH] Note 2
depontanata (Grote, 1864), Maryland [HT male] Note 3
fuciferata (Packard, 1876), New York [HT male, MCZ]
rhomboidaria (Oberthür, 1912), Costa Rica, San Jose [STs, BMNH] Note 2
rivulata (Warren, 1897), Costa Rica [HT female, BMNH] Note 2
sulphuraria (Packard, 1873), New York, West Farms; Middle States [HT female, MCZ]
sulphurata (Packard, 1876) Note 4
tiselaaria (Dyar. 1912), Mexico, Minerale de Zacualpan [HT male, USNM]

Pionenta Ferris, 2010, **gen. n.**

ochreata (Hulst, 1898), **comb. n.**, Arizona, Senator [HT male, AMNH]
arizonata (Taylor, 1905), **syn. rev.**, Arizona, Cochise Co., Huachuca Mts. [HT male, USNM]
dyari (Grossbeck, 1908), **syn. rev.**, Arizona, Huachuca Mts. [HT male, USNM]
hewesata (Sperry, 1948), **syn. n.**, Arizona, Oak Creek Canyon, Todd's Lodge [HT female, AMNH]
ligata (Grossbeck, 1908), **syn. rev.**, Arizona, Huachuca Mts. [HT male, USNM]

Notes:

1. Taylor stated in his original description that the HT was type number 9800 in the USNM. A recent attempt to locate the type failed, and it is presumed misplaced or lost. The TL was incorrectly stated as Prescott, Arizona in Parsons et al. (1999).
2. Barcoding of these taxa may ultimately indicate species distinct from *thisoaria*.
3. The type was originally placed in the collection of the Entomological Society of Philadelphia and subsequently in ANSP. In the 1960s, the bulk of the ANSP Lepidoptera collection went to CMNH. The type cannot be located in either ANSP or CMNH and is presumed lost.
4. Packard (1876) redescribed *Heterolocha sulphuraria* Packard, 1873 as *Antepione sulphurata*.